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THE DISTRIBUTION AND VARIATION OF THE SKINKS *EGERNIA PULCHRA* AND *E. BOS* IN WESTERN AUSTRALIA

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An examination of recently collected specimens of *Egernia pulchra* Werner, and *E. bos* Storr, has revealed a considerable amount of geographical and individual variation in these skinks. The nature of this variation and their present known distributions are outlined in the present article. Much of this new information is based on a collection of reptiles from the islands between Dongara and Lancelin obtained during a survey carried out by myself from 1959 to 1962. The specimens are now in the Western Australian Museum.

EGERNIA PULCHRA

Distribution

The mainland range of *E. pulchra* is the South-West of the State, north to Nanga Brook in the Darling Range, and east to Cheyne Beach on the south coast. Thus the distribution corresponds with the wettest and most humid parts of the South-West. Mitchell (1950) lists specimens (under the name of *E. napoleonis*) from as far inland as Ongerup and the Stirling Range but these specimens are actually *E. bos*, not *E. pulchra*.

Recently the species was found to occur on four islands near Jurien Bay on the west coast, *viz.*, Favourite, Boullanger, Escape and Whitlock Islands, about 180 miles north of the known mainland limit (Ford, 1963). These islands have a relatively dry climate. The species also occurs on Eclipse Island, off the south coast.

Jurien Bay Population

A comparison of 17 specimens from the Jurien Bay islands with mainland material has revealed several significant morphological differences. The Jurien Bay population differs from that on the mainland in having a relatively longer tail (the tail/head plus body ratio is 1.96-2.26 compared to 1.6-1.93 on the mainland), a bright orange ventral surface except the throat (whitish on the mainland), and a suffusion of orange on the upper and lower labials, auricular lobules, loreals, temporals, sides of neck and many of the pale spots on the back. The sexes are similar and the orange coloration is apparently not a breeding character since specimens taken on May 14, August 19, October 21, 1961, and November 11, 1962, were identi-

cal. When stored in alcohol, the orange colour gradually fades. (It is noteworthy that some individuals of *E. whitii multiscutata* Mitchell and Behrndt (1949), from the Greenly Islands off the South Australian coast, have a bright orange ventral surface in life.)

There are usually 8, sometimes 7 and 9, upper labials, compared to usually 7, sometimes 8 in the mainland population. Mid-body scales average less, the limits being 34-36 compared to 34-40 (mostly 36-38) on the mainland. In 14 of the 17 specimens, the nasals meet at a point instead of being separated by the rostral and frontonasal. There are 3, sometimes 4 ear lobules which decrease in size downwards. Otherwise the scalation is identical to the mainland population (see Storr, 1960).

Though the Jurien Bay population of *Egernia pulchra* may have negligible evolutionary potentiality, it is so distinct from the mainland population, and widely separated geographically from it, that it appears worthy of being categorised nomenclaturally:

Egernia pulchra longicauda subsp. nov.

The specimen Western Australian Museum No. R16772, ♂, collected on Favourite Island, Jurien Bay, on May 14, 1961, by J. R. Ford, is designated the holotype.

Variation in the South-West

The most common colour form is that described by Glauert (1960) as *E. napoleonis* (Gray) and figured by Storr (1960). There is a pale brown vertebral streak about two scales wide from the nape onto the tail flanked by black streaks about two scales wide with a single series of pale spots and dashes, extending onto the base of the tail where they break up into a series of black markings. These black streaks are each separated by a pale narrow dorso-lateral line from the sides which are heavily marked with black. The head is olive brown above with some black markings on the edges of the scales and shields, and the eyelids and ear lobules are creamy white. The ventral surface is whitish. I have examined specimens with the preceding description from Cheyne Beach, Chorkerup, Eclipse Island, Denmark and Nanga Brook. The Jurien Bay specimens have the above coloration except for the differences previously described. In odd specimens the pale vertebral streak is rather narrow and the inner margins of the black streaks are ragged edged so that there is more black dorsally.

In a large proportion of mainland specimens the black markings are considerably reduced. The vertebral streak is four scales wide from the nape for about a third of the length of the back and is chestnut in colour. The black streaks are ragged edged and narrower and the sides are merely speckled with black, thus giving a somewhat paler or washed out appearance. Individuals with this colour pattern were collected by me at Two People Bay on March 5, 1961, and near Mt. William in the Darling Range, on October 1, 1961. The specimen collected at Two People Bay (an adult) is also unusual in that it somewhat resembles *E. bos* in having a rather broad and

deep head and body, only 21 sub-digital lamellae under the fourth toe of the hind limb, and a relatively narrow ear opening. One of three specimens collected by G. M. Storr at Cheyne Beach on May 25, 1959, shows some reduction in width of the black dorsal streaks on the nape.

Details of trends in geographical variation on the mainland cannot be given at this stage because of the small amount of material available. It is possible, however, that there are south-north elines of decreasing number of mid-body scales, of increasing magnitude of the tail/head plus body ratio, and of increasing number of upper labials, and consequently there is the likelihood that the differences in the Jurien Bay population are merely expressions of the limits of the elines.

Ecology

At Jurien Bay, *E. p. longicauda* inhabits crevices between and under limestone rocks, and petrel burrows, and has never been observed burrowing. Its ecological relationship with the other members of the genus *Egernia* (*bos* and *kingii*) occurring on the islands has been previously discussed (Ford, 1963).

On the mainland, *E. pulchra* inhabits similar situations (Storr, 1960). I collected three specimens from leaf litter under low ledges of laterite near Mt. William. However, Storr has found that the species sometimes lives in shallow burrows, partly in leaf litter, beneath shrubs, and I collected two individuals (adult and juvenile) from a group of burrows in dune sand at the base of a clump of peppermint bushes (*Agonis flexuosa*) at Two People Bay. The adult is the specimen resembling *E. bos* mentioned earlier.

Relationships

As indicated by Storr, the affinities of *E. pulchra* lie with *E. whitii* Laeepede and *E. bos*. In the triearinate keeling of the dorsal scales and the orange coloration of the ventral surface of *E. p. longicauda*, the species shows a strong resemblance to *E. nitida* (Gray) which indicates that these two species are somewhat closely related.

EGERNIA BOS

Distribution

The specimens from Ongerup and Bernier Islands referred to by Storr (1960) belong to his *E. bos*. Since then the species has been collected near Pingelly, York, Boyagin and Lake Varley and there are also specimens in the W.A. Museum from Corrigin and Toolbrunup. Thus the distribution of this skink is roughly the southern portion of the State except the South-West heavy-forest corner, and there appears to be only a slight geographical overlap with the range of *E. pulchra*.

It is also now known to occur on six of the islands on the west coast between Dongara and Laneelin, *viz.*, Sandland, Favourite, Boullanger, Escape, Middle Essex and Laneelin, which includes

three of the Jurien Bay islands on which occurs *E. pulchra* (Ford, 1963).

Variation

Twenty-three specimens of this skink were collected on the six islands on which it occurs between Dongara and Lancelin. The scalation of these specimens is as follows: mid-body scales, 40-42; upper labials, 7-9; mostly 8; ear lobules, 3-5, mostly 4, decreasing slightly in size downwards (but the ear aperture is much smaller than in *E. pulchra*); and sub-digital lamellae on the fourth toe of the hind limb, 22-27. The tail/head plus body ratio is 1.36-1.85. In small (young) specimens the interparietal is slightly narrower than the frontal, but in large (adult) lizards, the interparietal is as wide as or wider than the frontal. These data indicate that the overlap in meristics and measurements of *E. bos* and *E. pulchra* are somewhat greater than those given by Storr (1960). Nevertheless, the two species are readily separated on the basis of colour pattern, body dimensions (*bos* is deep bodied and the snout is short and steep in profile) and the presence or absence of keeling on the dorsal scales (in *pulchra*, they are tricarinate, while in *bos*, they are smooth).

The colour pattern of the west coast island populations is basically the same as that of south coast specimens described by Storr. The Sandland Island specimens, however, differ slightly in that the pale dashes in two rows on each black dorsal streak are long thus tending to connect up with one another to form two pale streaks and thus divide each dorsal black streak into three longitudinal lines; consequently there is much less black dorsally compared with south coast specimens. Lancelin Island specimens have the outer dashes on each black streak connected as a narrow streak and the inner dashes are long. These two island specimens are somewhat like those from Bernier Island in coloration. Unsloughed specimens are much darker than those which have recently shed their skin.

Usually the ventral surface is greyish white, pale bluish grey or very pale green. A specimen collected 16 miles east of Pingelly on October 19, 1962, from a burrow in yellow sand had, however, a pinkish flush under the whole of the ventral surface before it faded when stored in ethanol. Another specimen from Lake Varley taken during March or April 1963, has this pinkish suffusion on all of the ventral surface except the throat which only has a small pink patch in the centre; this individual also has relatively wide, prominent black markings along the sutures on the throat and chin, and there is only a vestige of the outer rows of dashes on the dorsal black streaks.

Some mainland specimens have a relatively shallow head compared with typical *bos* from Cheyne Beach but it is usually deeper than in *E. pulchra*. A specimen collected near York and another at Pingelly are two such examples.

The scanty material available indicates the possible existence of south-north clines of decreasing number of mid-body scales, and of increasing magnitude of the tail/head plus body ratio.

Ecology

E. bos favours well drained sandplain country where it can burrow easily. On the islands between Dongara and Laneelin, it is mainly found in dune-sand locations away from the rocky areas where *E. pulchra* is so common. However, on islands where it is the only *Egernia* representative it frequently burrows under rocks in sandy situations except when there are other species competing for such sites (Ford, 1963). On Bernier Island, it has not been observed to burrow (Douglas and Ride, 1962), but in view of the species' habits in other parts of its range, it probably does.

Nomenclature

I have used the nomenclature proposed by Storr (1960). It is possible, however, that *bos* is a sub-species of *E. whitii* (Storr, pers. comm.). Glauert (1960) and Douglas and Ride (1962) discuss *bos* under the name of *E. whitii*.

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ASSOCIATION OF NESTING SEA-BIRDS AND VEGETATION TYPES ON ISLANDS OFF CAPE LEEWIN, SOUTH-WESTERN AUSTRALIA

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INTRODUCTION

Hamelin, St. Alouarn and Seal Islands off Cape Leeuwin in the extreme South-West of the Australian continent illustrate the manner in which colonies of nesting seabirds can alter the composition of the vegetation. These islands are less accessible than most of those on the west coast and relatively little disturbed by man. The only reference to them in the biological literature is of a visit made by John Gilbert in December 1842 to "one or more of the islands off Cape Leeuwin"

*Working in conjunction with C.S.I.R.O. Division of Wildlife Research.